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WISCONSIN EMPLOYMENT AND ECONOMIC INDICATORS

NOVEMBER 1981

WISCONSIN DILHR DEPARTMENT OF INDUSTRY, LABOR & HUMAN RELATIONS

WISCONSIN DATA AND SOURCES

	INDICATOR	SOURCE
L1	Average Work Week, Manufacturing	Wis. Dept. of Industry, Labor and Human Relations
L2	Accession Rate, Manufacturing	Wis. Dept. of Industry, Labor and Human Relations
L3	Layoff Rate, Manufacturing	Wis. Dept. of Industry, Labor and Human Relations
L4	Average Weekly Initial Claims	Wis. Dept. of Industry, Labor and Human Relations
L5	Business Failures (Dollars)	Dun & Bradstreet, Inc.
L6	New Business Incorporations	Wisconsin Secretary of State
L7	Business Failures (Number)	Dun & Bradstreet, Inc.
L8	Net Gain in Business Primary Phones	Wis. Telephone Co. and General Telephone Co.
L9	Building Plans Examined	Wis. Dept. of Industry, Labor and Human Relations
L10	Quit Rate, Manufacturing	Wis. Dept. of Industry, Labor and Human Relations
C1	Help-Wanted Advertising Index (Milw.)	National Industrial Conference Board
C2	Total Unemployment Rate	Wis. Dept. of Industry, Labor and Human Relations
C3	Natural Gas Sales	Wisconsin Public Service Commission
C4	New Car Registrations	Wis. Department of Transportation
C5	Electric Power Sales	Wisconsin Public Service Commission
C6	Total Security Registrations	Commissioner of Securities
C7	Personal Income	"Business Week," McGraw Hill
C8	Average Weekly Earnings, Mfg.	Wis. Dept. of Industry, Labor and Human Relations
C9	Cash Receipts From Farm Marketing	U.S. Department of Agriculture
C10	Contract Construction Employment	Wis. Dept. of Industry, Labor and Human Relations
X1	Birth Registrations	Wis. Department of Health and Social Services
X2	Death Registrations	Wis. Department of Health and Social Services
X3	Natural Net Gain in Population	Wis. Department of Health and Social Services
X4	Marriage Registrations	Wis. Department of Health and Social Services
X5	Consumer Price Index (Milwaukee)	U.S. Bureau of Labor Statistics
X6	Index of Prices Received By Farmers	Wisconsin Department of Agriculture
X7	Net Gain in Residential Primary Phones	Wis. Telephone Co. and General Telephone Co.
X8	Total Job Openings Received	Wis. Dept. of Industry, Labor and Human Relations
X9	Job Vacancies, Manufacturing	Wis. Dept. of Industry, Labor and Human Relations
X10	Manufacturing Employment	Wis. Dept. of Industry, Labor and Human Relations

NOTES: Selected series are seasonally adjusted by the Bureau of the Census X-11 Variant of the Census Method II Seasonal Adjustment Program. The adjusted data are plotted on arithmetic scales.

SECTION A is a summary of recent data and current changes for all indicators and is presented in chart form. The indicators are presented with cyclical timing as the principle basis of classification.

SECTION B is a summary of Wisconsin Labor Force Estimates, including Employment, Unemployment and Unemployment Rates, and selected U.S. data.

SECTION C analyzes the Wisconsin labor force by industry and by specified Standard Metropolitan Statistical Areas.

SECTION D singles out certain economic time series as being leading or coinciding in relation to movements in aggregate economic activity. They are seasonally adjusted and presented graphically. The indicators are grouped by cyclical timing.

COVER PHOTO: CONTEMPORARY CONTRAST, Mineral Point. Courtesy of Bob Coyle and the State Historical Society of Wisconsin.

THE WISCONSIN ECONOMY

SUMMARY FOR OCTOBER

Estimates in Brief

Employment in Wisconsin continued to show signs of deterioration in mid-October. The employment rate declined, and the unemployment rate rose, more sharply than the U.S. rates did, from a month-earlier. The unemployment rate also set modern-day records for any October on both an unadjusted and seasonally-adjusted basis.

Employment Index Declines from Month-Earlier, Advances from Year-Ago

Employment in mid-October (the week of Oct. 12) was up 7.8 per cent from the base year of 1977, compared to a U.S. growth rate of 11.3 per cent.

The state rate a month earlier was 8.7 per cent growth, and 7.4 per cent a year ago October.

The Index measures seasonally-adjusted growth in nonfarm wage and salary employment only.

Employment Rate Down from Month-Earlier and Year-Ago

The per cent of the state's working-age population earning wages and salaries in October was 53.7 per cent, the lowest rate since November of 1977. That was below the September rate of 54.2 per cent, the year-ago rate of 54.1 percent, and the U.S. rate for October, 1981, of 54.9 per cent.

Unemployment Rises Above U.S. Rate -- Again

Unemployment worsened significantly from September to October in Wisconsin, with broad-based job losses. An increase of 18,300 unemployed casued the state's unadjusted unemployment rate to rise from 6.7 per cent in mid-September to 7.5 per cent in mid-October. On a seasonally-adjusted basis, the unemployment rate went from 7.3 per cent to 8.1 per cent.

The unadjusted rate was the highest for any October since 1954, when the state began keeping detailed records. It was the highest for any month since 8.9 per cent was recorded in March, 1981. The seasonally-adjusted rate was the highest for any October since 1960, as far back as adjusted data goes. It was the highest for any month since June, 1975, when adjusted unemployment in the last recession peaked at 8.2 per cent. The October rate also was the fourth time in the state's modern history, and the fourth time this year, that the seasonally-adjusted rate surpassed the U.S. rate. The U.S. rate for mid-October was 8.0 per cent.

Manufacturing Employment Declines

Wisconsin's manufacturing industries accounted for about 28 per cent of all nonfarm wage and salary employment in October, the largest single employing industry. This employment decreased by 26,100 from September, led by decreases in transportation equipment manufacturing and food processing. All industries in manufacturing either decreased or remained unchanged.

Section

A WISCONSIN ECONOMIC INDICATORS

INDICATOR	UNIT	MONTHLY SERIES Latest Month		Mo/Ago	Yr/Ago	% CHANGE Mo/Ago	Yr/Ago	AVG. 1980
LEADING INDICATORS								
L1 AVG. WORK WEEK, MFG.								
Unadjusted	HOURS	39.9P	Oct	40.1	40.1	-0.5	-0.5	40.2
Seasonally Adjusted		39.8P		40.0	40.0	-0.5	-0.5	
L2 ACCESSION RATE, MFG.								
Unadjusted	RATE PER	2.6	Sep	2.4	3.4	-	-	3.1
Seasonally Adjusted	100 EMPL.	2.4		1.7	3.1	-	-	
L3 LAYOFF RATE, MFG.								
Unadjusted	RATE PER	1.5	Sep	1.1	2.4	-	-	2.3
Seasonally Adjusted	100 EMPL.	1.4		1.5	2.2	-	-	
L4 AVG. WEEKLY INITIAL CLAIMS								
Unadjusted	NUMBER	12,315	Oct	8,187	10,427	50.4	18.1	12,627
Seasonally Adjusted		16,870		13,248	14,287	27.3	18.1	
L5 BUSINESS FAILURES								
Unadjusted	THOUS.	20,238	Apr	5,299	1,952	281.9	936.8	4,119
Seasonally Adjusted	DOL.	27,497		9,152	2,053	200.4	1239.4	
L6 NEW BUSINESS INCORPORATIONS								
Unadjusted	NUMBER	521	Oct	536	703	-2.8	-25.9	548
Seasonally Adjusted		555		561	749	-1.1	-25.9	
L7 BUSINESS FAILURES								
Unadjusted	NUMBER	48	Apr	23	12	108.7	300.0	16
Seasonally Adjusted		50		34	12	47.1	316.7	
L8 NET GAIN IN BUSINESS PHONES (PRIMARY)								
Unadjusted	NUMBER	-1,452	Oct	380	34	-482.1	4170.6	157
Seasonally Adjusted		-1,309		77	177	-1800.0	-839.5	
L9 BUILDING PLANS EXAMINED								
Unadjusted	NUMBER	299	Sep	268	370	11.6	-19.2	303
Seasonally Adjusted		232		236	288	-1.7	-19.4	
L10 QUIT RATE, MANUFACTURING								
Unadjusted	RATE PER	1.1	Sep	1.4	1.4	-	-	0.9
Seasonally Adjusted	EMPL.	0.7		0.6	0.9	-	-	
ROUGHLY COINCIDENT INDICATORS								
C1 HELP-WANTED INDEX (MILW.)								
Seasonally Adjusted	INDEX	50	Oct	55	62	-9.1	-19.4	73
C2 UNEMPLOYMENT RATE, TOTAL								
Unadjusted	PERCENT	7.5P	Oct	6.7	6.3	-	-	7.0
Seasonally Adjusted		8.1P		7.3	7.3	-	-	
C3 NATURAL GAS SALES								
Unadjusted	MIL.	127.0	Aug	121.9	126.8	4.2	0.2	273.5
Seasonally Adjusted	THERMS	258.7		257.2	258.2	0.6	0.2	
C4 NEW CAR REGISTRATIONS								
Unadjusted	NUMBER	12,543	Oct	15,717	19,094	-20.2	-34.3	15,429
Seasonally Adjusted		10,538		17,337	16,039	-39.2	-34.3	
C5 ELECTRIC POWER SALES								
Unadjusted	MIL. KWH	1839.7	Aug	1838.3	1767.6	0.1	4.1	1699.0
Seasonally Adjusted		1755.4		1805.8	1686.8	-2.8	4.1	

P = Preliminary

Section

A WISCONSIN ECONOMIC INDICATORS

INDICATOR	UNIT	MONTHLY SERIES Latest Month		Mo/Ago	Yr/Ago	% CHANGE Mo/Ago	Yr/Ago	AVG. 1980
C6 TOTAL SECURITY REGISTRATIONS								
Unadjusted	MIL. DOL.	49.0	Oct	22.3	52.4	119.7	-6.5	39.2
Seasonally Adjusted		46.9		22.3	50.1	110.3	-6.4	
C7 PERSONAL INCOME								
Unadjusted	MIL. DOL.	4,075	Aug	4,107	3,682	-0.8	10.7	3,712
Seasonally Adjusted		4,091		4,148	3,697	-1.4	10.7	
C8 AVG. WEEKLY EARNINGS, MFG.								
Unadjusted	DOLLARS	358.33P	Oct	355.75	332.88	0.7	7.6	323.21
Seasonally Adjusted		355.84P		356.11	330.49	-0.1	7.7	
C9 CASH RECEIPTS FROM FARM MKTG.								
Unadjusted	MIL. DOL.	395.0	Sep	449.5	371.4	-12.1	6.4	377.6
Seasonally Adjusted		400.6		440.7	376.7	-9.1	6.3	
C10CONTRACT CONSTRUCTION EMPL.								
Unadjusted	THOUS	70.7P	Oct	70.8	76.3	-0.1	-7.3	71.2
Seasonally Adjusted		64.0P		63.6	69.1	0.6	-7.4	
OTHER KEY INDICATORS								
X1 BIRTH REGISTRATIONS								
Unadjusted	NUMBER	6,300	Sep	6,243	6,683	0.9	-5.7	6,123
Seasonally Adjusted		5,502		5,890	5,836	-6.6	-5.7	
X2 DEATH REGISTRATIONS								
Unadjusted	NUMBER	3,355	Sep	2,970	3,308	13.0	1.4	3,395
Seasonally Adjusted		3,315		3,116	3,268	6.4	1.4	
X3 NATURAL NET GAIN POPULATION								
Unadjusted	NUMBER	2,945	Sep	3,273	3,375	-10.0	-12.7	2,728
Seasonally Adjusted		2,208		2,746	2,530	-19.6	-12.7	
X4 MARRIAGE REGISTRATIONS								
Unadjusted	NUMBER	4,607	Sep	4,579	4,430	0.6	4.0	3,403
Seasonally Adjusted		3,413		3,316	3,281	2.9	4.0	
X5 CONSUMER PRICE INDEX (MILW.)				(Jul)				
Unadjusted	INDEX	286.9	Sep	285.6	258.4	0.5	11.0	251.5
X6 PRICES RECEIVED BY FARMERS								
Unadjusted	INDEX	284	Oct	285	287	-0.4	-1.0	270
Seasonally Adjusted		283		285	286	-0.7	-1.0	
X7 NET GAIN IN RESIDENTIAL PHONES (PRIMARY)								
Unadjusted	NUMBER	-187	Oct	2,965	2,578	-106.3	-107.3	1,880
Seasonally Adjusted		-900		-2,193	1,865	59.0	-148.3	
X8 TOTAL JOB OPENINGS REC.								
Unadjusted	NUMBER	7,248	Oct	11,027	8,991	-34.3	-19.4	9,760
Seasonally Adjusted		6,929		10,144	8,599	-31.7	-19.4	
X9 JOB VACANCIES, MFG.								
Unadjusted	NUMBER	1,468	Sep	1,626	1,686	-9.7	-12.9	2,057
Seasonally Adjusted		1,395		1,454	1,603	-4.1	-13.0	
X10MANUFACTURING EMPL.								
Unadjusted	THOUS	544.8P	Oct	572.1	552.7	-4.8	-1.4	561.9
Seasonally Adjusted		540.5P		559.2	548.3	-3.3	-1.4	

P = Preliminary

Section

B

LABOR FORCE ESTIMATES

WISCONSIN LABOR FORCE ESTIMATES OCTOBER	(In Thousands)			Pct. Chg.	
	Latest Month	Month Ago	Year Ago	Month Ago	Year Ago
Unadjusted					
CIVILIAN LABOR FORCE	2445.0	2466.2	2395.0	-0.9	10.2
Employment (Inc. Labor Disputes)	2262.4	2301.8	2243.1	-1.7	0.9
Unemployment	182.6	164.3	151.9	11.1	20.2
Unemployment Rate	7.5	6.7	6.3	-	-
Seasonally Adjusted					
CIVILIAN LABOR FORCE	2432.1	2422.8	2401.9	0.4	1.3
Employment (Inc. Labor Disputes)	2234.3	2245.3	2226.8	-0.5	0.3
Unemployment	197.8	177.5	175.1	11.4	13.0
Unemployment Rate	8.1	7.3	7.3	-	-

WISCONSIN EMPLOYMENT ESTIMATES OCTOBER	(In Thousands)			Pct. Chg.	
	Latest Month	Month Ago	Year Ago	Month Ago	Year Ago
TOTAL NONFARM WAGE AND SALARY WORKERS	1969.2	1984.1	1960.3	-0.8	0.5
Unadjusted					
Manufacturing	544.7	570.8	550.8	-4.6	-1.1
Mining	2.3	2.3	2.8	0.0	-17.9
Contract Construction	70.6	70.8	76.3	-0.3	-7.5
Transportation and Public Utilities	92.9	92.0	95.0	1.0	-2.2
Elec., Gas and Sanitary Services	17.0	17.0	16.6	0.0	2.4
Wholesale Trade	98.8	98.7	96.5	0.1	2.4
Retail Trade	353.2	350.7	350.9	0.7	0.7
General Merchandise	47.4	45.8	49.4	3.5	-4.0
Finance, Insurance and Real Estate	96.3	96.4	94.3	-0.1	2.1
Banking	27.1	27.1	26.5	0.0	2.3
Insurance	30.6	30.6	30.6	0.0	0.0
Service and Miscellaneous	386.4	387.5	370.7	-0.3	4.2
Hospitals	74.4	74.4	72.6	0.0	2.5
Private Education	23.6	22.6	23.2	4.4	1.7
Government	324.0	314.9	322.9	2.9	0.3
State Government	81.3	80.1	80.2	1.5	1.4
Local Government	215.1	207.0	215.0	3.9	0.0

UNITED STATES LABOR FORCE ESTIMATES OCTOBER	(In Thousands)			Pct. Chg.	
	Latest Month	Month Ago	Year Ago	Month Ago	Year Ago
Seasonally Adjusted					
CIVILIAN LABOR FORCE	106,736	106,236	105,167	0.5	1.5
Employment	98,217	98,270	97,206	-0.1	1.0
Unemployment	8,520	7,966	7,961	7.0	7.0
Unemployment Rate	8.0	7.5	7.6	-	-

Section

C SUMMARY OF WISCONSIN JOB OPENINGS

JOB OPENINGS *(Unadjusted)* SEPTEMBER	Number of Job Openings			Job Openings Rates (Openings Per 100 Jobs)		
	Latest Month	Month Ago	Year Ago	Latest Month	Month Ago	Year Ago
ALL NONFARM INDUSTRIES	13,320	12,054	13,280	0.7	0.6	0.7
Manufacturing (Excluding Canning)	1,417	1,569	1,646	0.3	0.2	0.3
Manufacturing (Including Canning)	1,468	1,626	1,686	0.3	0.2	0.3
Durable Goods	1,084	1,254	1,167	0.3	0.2	0.3
Lumber and Wood Products (Except Furniture)	3	3	2	*	*	*
Furniture and Fixtures	5	3	15	0.1	*	0.2
Stone, Clay and Glass Products	2	0	13	*	*	0.1
Primary Metal Industries	27	43	38	0.1	0.2	0.1
Fabricated Metal Products	169	178	246	0.3	0.1	0.4
Machinery (Excluding Electrical)	397	513	421	0.3	0.4	0.3
Electrical Machinery, Equipment and Supplies	266	212	129	0.5	0.4	0.2
Transportation Equipment	54	68	135	0.1	0.2	0.4
Instruments and Related Products	123	155	102	1.0	1.2	0.9
Nondurable Goods	384	372	516	0.2	0.2	0.3
Food and Kindred Products	152	168	324	0.2	0.2	0.4
Textile Mill Products	5	14	2	0.1	0.3	*
Apparel and Other Finished Products	93	39	72	1.4	0.6	1.2
Paper and Allied Products	55	33	36	0.1	0.1	0.1
Printing, Publishing and Allied Products	12	16	19	*	0.1	0.1
Chemicals and Allied Products	56	82	64	0.6	0.8	0.6
Rubber and Misc. Plastics Products	11	17	1	0.1	0.1	*
Leather and Leather Products	0	3	1	*	*	*
All Nonmanufacturing Industries	11,852	10,428	11,594	0.8	0.7	0.8
Transportation, Communication and Public Utilities	235	228	209	0.3	0.3	0.2
Trade	2,436	1,351	1,469	0.5	0.3	0.3
Finance, Insurance and Real Estate	658	684	774	0.7	0.7	0.8
Service (Including Hospitals)	3,115	3,144	4,427	0.8	0.8	1.2
Hospitals	904	969	1,154	1.2	1.3	1.6
Government	5,259	4,701	4,537	1.6	1.5	1.5

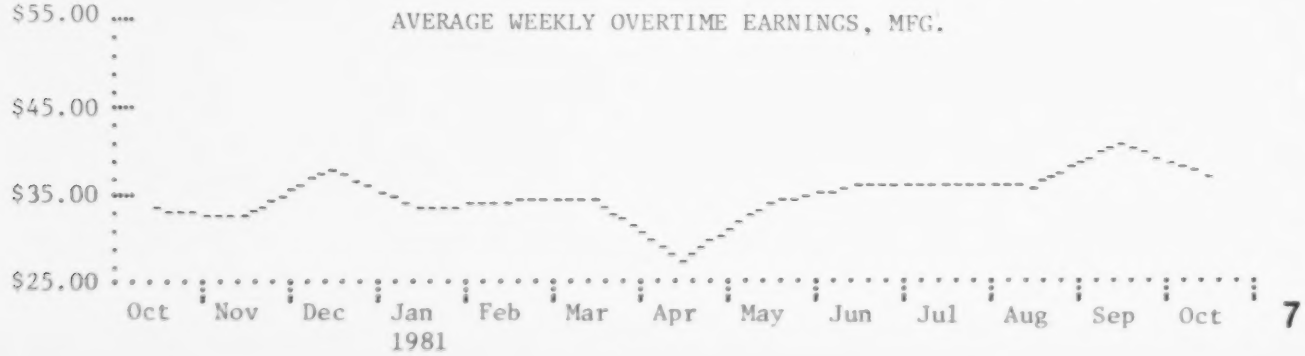
* Rate Less Than 0.05.

MANUFACTURING EMPLOYMENT *(Unadjusted)* OCTOBER	(In Thousands)		
	Latest Month	Month Ago	Year Ago
All Manufacturing (Including Canning)	544.7	570.8	550.8
All Manufacturing (Excluding Canning)	531.3	546.9	539.2
Durable Goods	350.4	363.7	355.4
Lumber and Wood Prod., (Except Furniture)	20.5	20.9	20.5
Sawmills and Planning Mills	2.9	3.0	2.8
Millwork, Veneer, Plywood & Prefab. Wood Prod.	9.6	9.8	9.2
Furniture and Fixtures	9.1	9.3	9.1
Household Furniture	4.0	4.1	3.8
Stone, Clay and Glass Products	9.0	9.2	9.7
Concrete, Gypsum and Plaster Products	4.7	4.8	5.3
Primary Metal Industries	26.5	27.1	24.9
Iron and Steel Foundries	16.3	16.6	14.9
Fabricated Metal Products	56.3	57.5	57.1
Heating Equipment (Except Electrical) & Plumbing Fixtures	5.7	5.8	6.0
Fabricated Structural Metal Products	13.6	13.9	14.2
Metal Stampings	16.2	16.8	16.2
Machinery (Except Electrical)	121.1	122.3	120.3
Engines and Turbines	22.9	22.7	22.1
Farm Machinery and Equipment	17.9	18.4	18.1
Const., Min. & Material Handling Mach. & Equip.	18.5	18.7	19.9
Metalworking Machinery and Equipment	12.8	12.8	11.4
Special Industry Machinery (Except Metalworking)	12.3	12.4	12.9
General Industrial Machinery and Equipment	17.2	17.5	17.1
Service Industry Machines	8.3	8.3	7.9
Electrical Machinery, Equipment and Supplies	54.9	56.0	55.1
Electrical Industrial Apparatus	20.6	20.7	20.5
Household Appliances	7.6	8.0	8.0
Transportation Equipment	29.2	37.3	35.6
Motor Vehicles and Equipment	20.6	28.2	27.1
Instruments and Related Products	12.3	12.5	12.2
Miscellaneous Manufacturing	11.5	11.6	10.8
Nondurable Goods	194.2	207.1	195.4
Food and Kindred Products	66.8	77.9	67.0
Meat Products	13.4	13.3	12.9
Dairy Products	16.4	16.8	17.3
Canning and Preserving	13.3	23.9	11.7
Bakery Products	4.5	4.6	5.0
Beverage Industries	11.8	12.0	12.9
Textile Mill Products	4.4	4.5	4.6
Knitting Mills	3.5	3.6	3.6
Apparel and Other Finished Products	6.3	6.5	6.7
Paper and Allied Products	48.4	49.0	47.7
Pulp and Paper Mills	30.7	31.0	30.2
Converted Paper and Paperboard Products	9.2	9.3	9.0
Paperboard Containers and Boxes	7.2	7.3	7.2
Printing, Publishing and Allied Industries	31.5	31.8	32.0
Newspapers	10.7	10.7	11.0
Commercial Printing	12.1	12.4	12.2
Chemicals and Allied Products	9.8	9.8	9.7
Rubber and Misc. Plastics Products	17.4	17.9	17.9
Miscellaneous Plastics Products	13.4	13.7	13.3
Leather and Leather Products	9.3	9.3	9.4
Leather Tanning and Finishing	2.8	2.8	2.8
Footwear (Except Rubber)	4.5	4.5	4.7
Other Nondurable Goods	0.4	0.4	0.4

Section

C WISCONSIN EARNINGS AND HOURS DATA

EARNINGS AND HOURS *(Unadjusted)* OCTOBER	Average Weekly Earnings			Average Weekly Hours			Average Hourly Earnings Including O.T.			Average Hourly Earnings Excluding O.T.	
	Latest Month	Mo. Ago	Yr. Ago	Latest Month	Mo. Ago	Yr. Ago	Latest Month	Mo. Ago	Yr. Ago	Latest Month	Mo. Ago
All Manufacturing (Incl. Canning)	$358	$356	$333	39.9	40.1	40.1	$8.97	$8.88	$8.31	$8.65	$8.57
All Manufacturing (Excl. Canning)	$363	$364	$336	40.1	40.0	40.1	9.07	9.10	8.38	8.74	8.76
Durable Goods	365	364	340	39.7	39.5	39.9	9.20	9.20	8.52	8.91	8.94
Lumber/Wood Prod. (Exc. Furn.)	252	254	247	38.2	38.6	40.3	6.60	6.58	6.13	6.45	6.44
Furniture and Fixtures	264	266	243	39.5	39.6	39.3	6.68	6.71	6.17	-	-
Stone, Clay and Glass Products	347	345	335	41.4	41.9	42.7	8.38	8.24	7.84	8.12	8.01
Primary Metal Industries	363	347	334	39.5	38.2	39.8	9.18	9.07	8.40	8.89	8.79
Iron and Steel Foundries	364	343	324	40.0	38.1	39.1	9.09	9.00	8.29	8.80	8.72
Fabricated Metal Products	363	351	338	40.0	39.0	40.0	9.08	9.00	8.45	8.71	8.62
Fab. Structural Metal Prod.	348	344	318	40.6	39.9	40.5	8.58	8.62	7.85	8.28	8.31
Metal Stampings	366	347	346	38.6	37.2	38.6	9.48	9.32	8.96	9.28	9.15
Machinery (Except Electrical)	414	409	375	40.3	40.2	40.0	10.28	10.18	9.36	10.06	9.95
Engines and Turbines	440	437	390	39.9	40.0	38.8	11.04	10.93	10.04	10.80	10.73
Farm Machinery and Equip.	447	441	401	40.7	40.3	40.5	10.98	10.94	9.90	10.78	10.75
Const. and Related Mach.	422	419	397	39.6	39.6	40.4	10.65	10.57	9.83	10.45	10.41
Metalworking Mach. and Equip.	409	401	376	40.8	40.4	40.2	10.03	9.91	9.36	9.78	9.57
Spec. Ind. Mach. (Exc. Metal).	409	410	386	41.6	42.1	42.7	9.82	9.73	9.03	9.44	9.32
Gen. Industrial Mach. and Equip.	421	425	393	39.3	39.7	40.0	10.72	10.71	9.82	10.55	10.37
Electrical Mach., Equip. and Supp.	338	333	307	39.7	39.8	39.1	8.53	8.35	7.86	8.31	8.14
Electrical Industrial Apparatus	372	374	325	40.1	41.3	38.6	9.29	9.05	8.42	8.98	8.72
Transportation Equipment	449	458	425	39.1	39.4	40.1	11.48	11.63	10.61	10.76	11.25
Instruments and Related Prod.	294	291	263	39.4	39.0	39.2	7.47	7.46	6.72	7.36	7.35
Nondurable Goods	345	342	320	40.3	41.0	40.5	8.58	8.34	7.92	8.16	7.90
Food and Kindred Products	332	323	317	38.7	41.1	39.6	8.58	7.85	8.00	8.16	7.49
Meat Products	412	423	373	39.1	40.3	38.6	10.52	10.50	9.67	10.08	10.06
Dairy Products	330	341	313	40.1	41.0	41.4	8.22	8.33	7.55	7.87	7.91
Textile Mill Products	240	241	220	37.7	37.2	38.1	6.36	6.47	5.79	6.14	6.21
Apparel and Other Fin. Prod.	190	191	184	36.7	37.0	37.2	5.18	5.16	4.94	5.08	5.04
Paper and Allied Products	425	436	384	44.9	44.8	44.3	9.47	9.74	8.66	8.94	9.04
Pulp and Paper Mills	457	474	412	46.2	46.2	45.2	9.89	10.28	9.10	9.29	9.48
Printing, Pub. and Allied Prod.	384	380	342	39.2	39.2	38.4	9.79	9.69	8.89	-	-
Chemicals and Allied Products	386	379	361	40.2	40.3	40.4	9.60	9.40	8.93	9.41	9.22
Rubber and Misc. Plastics Prod.	275	270	269	38.7	38.0	39.7	7.12	7.11	6.78	6.95	6.91
Leather and Leather Products	234	230	213	39.1	38.3	38.4	5.99	6.00	5.55	5.85	5.86

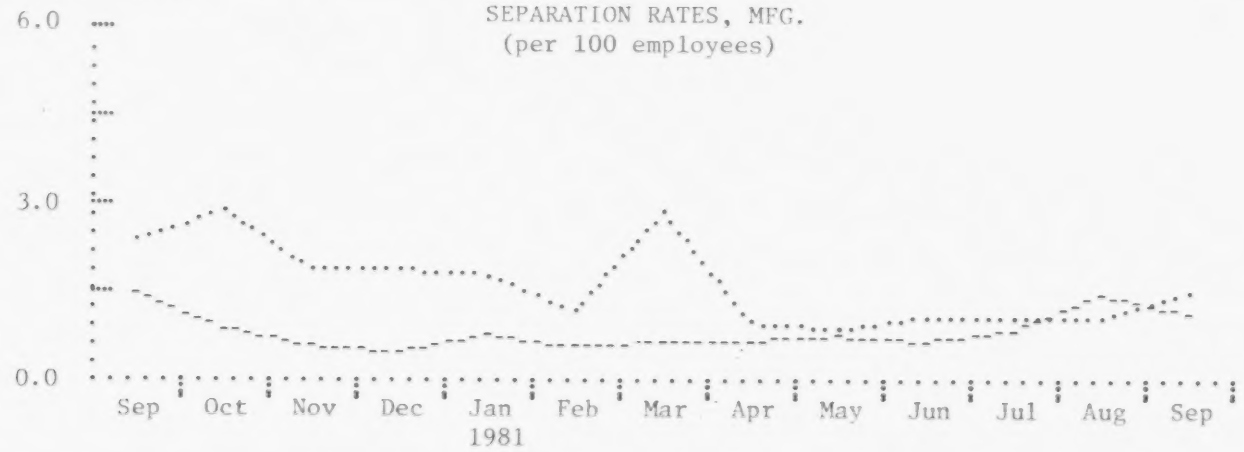


Section

C WISCONSIN LABOR TURNOVER RATES

LABOR TURNOVER RATES *(Rates Per 100 Employees)* SEPTEMBER	SEPARATION RATES								
	TOTAL			QUITS			LAYOFFS		
	Latest Month	Mo. Ago	Yr. Ago	Latest Month	Mo. Ago	Yr. Ago	Latest Month	Mo. Ago	Yr. Ago
ALL NONFARM INDUSTRIES	4.6	4.0	4.8	2.2	2.2	2.7	1.5	1.1	1.3
Manufacturing (Excluding Canning)	3.0	3.0	3.5	1.0	1.2	1.0	1.3	1.1	1.6
Manufacturing (Including Canning)	3.4	3.1	4.7	1.1	1.4	1.4	1.5	1.1	2.4
Durable Goods	3.0	2.7	3.6	0.8	1.0	0.9	1.3	1.1	1.8
Lumber and Wood Products (Except Furniture)	3.4	5.0	1.2	1.5	3.5	0.4	1.5	1.1	0.7
Furniture and Fixtures	3.3	3.9	3.2	1.2	2.7	0.9	1.4	0.9	1.0
Stone, Clay and Glass Products	2.7	5.3	2.7	0.8	3.3	1.0	1.5	1.1	0.8
Primary Metal Industries	4.5	4.2	5.6	0.9	1.5	2.6	3.1	1.7	2.2
Fabricated Metal Products	2.8	0.6	3.6	0.9	0.3	1.0	1.1	0.2	2.0
Machinery (Except Electrical)	2.1	2.9	2.9	0.5	0.9	0.5	0.8	1.0	1.5
Electrical Machinery, Equipment and Supplies	2.7	2.3	3.0	1.2	1.3	0.9	1.0	0.4	1.6
Transportation Equipment	5.3	10.9	6.7	0.3	0.5	0.4	2.6	8.3	3.7
Instruments and Related Products	1.9	2.6	2.8	1.5	1.8	1.3	0.1	0.5	1.0
Nondurable Goods	4.1	4.1	6.6	1.7	2.3	2.4	1.8	1.0	3.5
Food and Kindred Products	6.0	5.7	12.6	2.3	3.2	4.3	2.9	1.3	7.5
Textile Mill Products	9.5	9.5	12.9	1.8	2.1	3.4	7.1	7.1	8.7
Apparel and Other Finished Products	5.7	2.8	5.2	3.2	1.7	2.5	1.2	0.8	1.9
Paper and Allied Products	2.2	3.2	2.6	1.2	2.1	0.8	0.7	0.6	1.3
Printing, Publishing and Allied Products	2.2	2.5	2.1	1.5	1.7	1.5	0.3	0.5	0.3
Chemicals and Allied Products	2.6	2.2	3.1	2.0	1.6	2.2	0.4	0.1	0.4
Rubber and Misc. Plastics Products	3.1	2.6	1.9	0.6	0.8	0.6	2.1	1.3	0.8
Leather and Leather Products	3.7	4.3	3.4	1.5	2.4	1.7	1.3	0.7	0.7
All Nonmanufacturing Industries	5.0	4.5	4.8	2.6	2.7	3.3	1.5	1.1	0.9
Transportation, Communication and Public Utilities	10.7	2.9	1.8	1.5	0.9	1.2	8.7	1.5	0.3
Trade	4.8	5.9	4.8	3.1	3.5	3.6	1.0	1.6	0.5
Finance, Insurance and Real Estate	2.2	2.4	2.2	1.7	1.9	1.8	0.1	*	*
Service (Including Hospitals)	5.2	4.8	5.7	3.3	3.6	4.4	0.6	0.4	0.6
Government	4.0	2.7	5.4	2.2	1.4	3.1	1.0	0.8	1.4

* Rate Less Than 0.05.

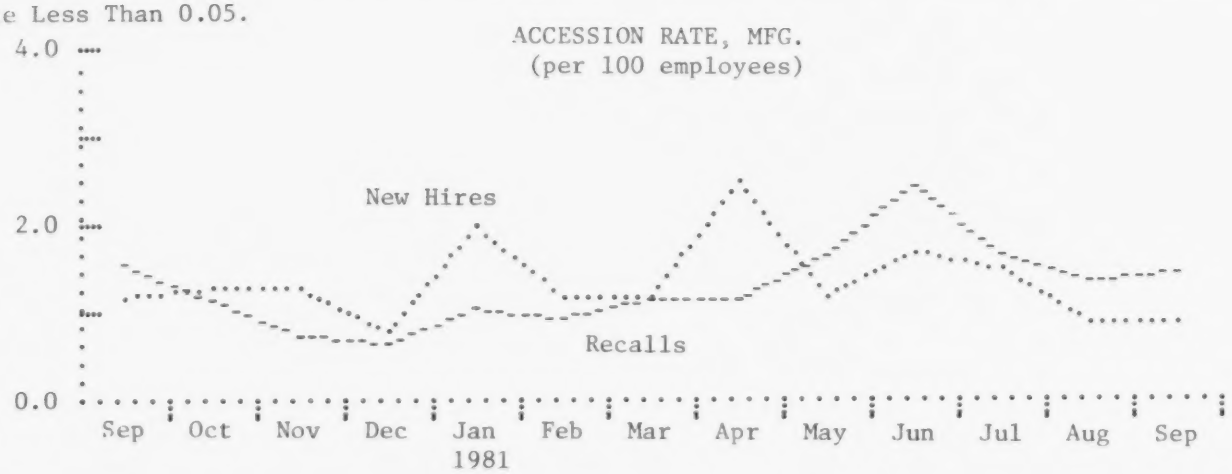


Section

C WISCONSIN LABOR TURNOVER RATES

LABOR TURNOVER RATES *(Rates Per 100 Employees)* SEPTEMBER	ACCESSION RATES								
	TOTAL			NEW HIRES			RECALLS		
	Latest Month	Mo. Ago	Yr. Ago	Latest Month	Mo. Ago	Yr. Ago	Latest Month	Mo. Ago	Yr. Ago
ALL NONFARM INDUSTRIES	4.9	4.0	5.8	3.0	2.7	3.5	1.8	1.2	2.0
Manufacturing (Excluding Canning)	2.5	2.0	3.0	1.2	0.9	1.1	0.9	0.7	1.2
Manufacturing (Including Canning)	2.6	2.4	3.4	1.4	1.3	1.5	0.9	0.9	1.2
Durable Goods	2.5	2.0	3.3	1.1	0.8	0.9	0.9	0.8	1.4
Lumber and Wood Products (Except Furniture)	1.4	2.1	0.7	1.0	1.9	0.5	0.4	0.2	0.2
Furniture and Fixtures	2.9	2.4	2.7	1.9	2.2	1.3	0.9	0.2	1.4
Stone, Clay and Glass Products	1.5	2.9	2.0	0.6	1.7	1.1	0.9	1.0	0.8
Primary Metal Industries	2.0	2.8	2.8	1.4	1.6	1.4	0.6	1.0	1.3
Fabricated Metal Products	1.8	0.5	2.6	1.0	0.3	1.4	0.5	0.1	1.1
Machinery (Except Electrical)	3.0	3.6	3.2	0.9	1.0	0.6	1.4	2.1	1.6
Electrical Machinery, Equipment and Supplies	1.7	2.0	2.8	1.3	1.3	0.8	0.2	0.4	1.2
Transportation Equipment	4.2	3.5	7.9	0.4	0.5	0.5	2.1	1.4	2.7
Instruments and Related Products	1.5	1.7	1.9	1.2	1.3	1.0	0.2	0.3	0.9
Nondurable Goods	2.8	3.5	3.6	1.9	2.3	2.5	0.8	1.0	1.0
Food and Kindred Products	3.7	6.0	5.6	2.5	4.0	4.3	1.0	1.6	1.2
Textile Mill Products	5.4	4.2	5.4	0.7	0.6	0.6	4.6	3.4	4.4
Apparel and Other Finished Products	6.3	2.9	4.2	5.9	2.1	2.6	0.4	0.6	1.4
Paper and Allied Products	1.6	1.7	1.8	1.0	1.1	0.7	0.5	0.5	1.0
Printing, Publishing and Allied Products	2.8	2.2	2.8	2.0	1.7	2.4	0.6	0.4	0.4
Chemicals and Allied Products	1.0	1.5	1.6	0.9	0.8	0.9	0.1	0.6	0.6
Rubber and Misc. Plastics Products	1.7	1.4	2.1	0.7	0.5	1.1	0.9	0.5	0.6
Leather and Leather Products	3.1	3.3	2.8	2.2	2.3	2.0	0.5	0.6	0.5
All Nonmanufacturing Industries	5.8	4.8	6.8	3.6	3.4	4.3	2.1	1.3	2.3
Transportation, Communication and Public Utilities	3.8	4.6	4.7	1.5	1.9	1.4	2.1	2.6	3.2
Trade	10.7	7.0	11.5	5.7	4.6	6.6	5.0	2.3	4.9
Finance, Insurance and Real Estate	2.0	1.9	3.0	1.7	1.8	2.7	0.2	*	0.1
Service (Including Hospitals)	4.7	4.6	5.8	4.2	4.1	4.9	0.4	0.4	0.6
Government	2.0	2.6	2 2	1.2	1.5	1.6	0.5	1.0	0.3

* Rate Less Than 0.05.



Section

C SUMMARY OF RECENT WISCONSIN DATA

EARNINGS AND HOURS, MFG. Production Workers (Unadjusted) OCTOBER	Average Weekly Earnings			Average Weekly Hours			Average Hourly Earnings Including O.T.			Average Hourly Earnings Excluding O.T.	
	Latest Month	Month Ago	Year Ago	Latest Month	Month Ago	Year Ago	Latest Month	Month Ago	Year Ago	Latest Month	Month Ago
United States	$322	$322	$298	39.5	39.5	39.8	8.14	8.14	7.49	-	-
Wisconsin	358	356	333	39.9	40.1	40.1	8.97	8.88	8.31	8.65	8.57
Selected Areas											
Appleton-Oshkosh (Calumet-Winnebago-Outagamie)	355	361	322	41.1	42.0	41.1	8.63	8.59	7.84	7.88	8.16
Beloit (City)	346	348	344	41.6	41.3	44.2	8.32	8.41	7.78	8.28	8.35
Eau Claire (Eau Claire-Chippewa)	352	355	339	40.8	40.8	42.2	8.63	8.69	8.03	8.54	8.64
Fond du Lac (City)	328	297	307	39.6	38.8	39.5	8.29	7.65	7.77	8.13	7.31
Green Bay (Brown County)	375	381	348	41.2	42.6	41.9	9.12	8.95	8.30	8.57	8.39
Janesville (City)	427	409	400	39.7	37.4	37.9	10.74	10.95	10.55	10.31	10.65
Kenosha (County)	360	426	389	37.6	39.6	39.7	9.57	10.75	9.78	8.21	10.19
La Crosse (County)	311	315	284	39.2	40.2	40.3	7.95	7.84	7.05	7.64	7.55
Madison (Dane County)	340	346	325	39.4	40.0	38.7	8.64	8.63	8.41	8.33	8.39
Manitowoc (City)	287	285	264	39.0	38.9	39.1	7.38	7.32	6.75	7.19	7.14
Milwaukee (Milwaukee-Ozaukee-Waukesha-Washington)	397	390	366	39.8	39.3	39.7	9.98	9.91	9.21	9.69	9.60
Racine (County)	385	380	354	39.9	39.6	39.9	9.65	9.59	8.87	9.40	9.26
Sheboygan (County)	330	322	303	38.0	38.0	38.6	8.69	8.47	7.84	8.39	8.23
Wausau (Marathon County)	382	386	360	43.0	44.1	43.6	8.89	8.76	8.26	8.57	8.43

EMPLOYMENT, MFG. (Unadjusted) OCTOBER	(In Thousands)			Percent Change	
	Latest Month	Month Ago	Year Ago	Month Ago	Year Ago
United States	20,350.0	20,608.0	20,235.0	-1.3	0.6
Wisconsin	544.7	570.8	550.9	-4.6	-1.1
Selected Areas					
Appleton-Oshkosh (Calumet-Winnebago-Outagamie)	47.2	48.2	46.5	-2.1	1.5
Beloit (City)	7.4	7.4	6.9	0.0	7.2
Eau Claire (Eau Claire-Chippewa)	8.6	8.6	8.8	0.0	-2.3
Fond du Lac (City)	10.6	12.1	9.3	-12.4	14.0
Green Bay (Brown County)	22.2	22.8	22.0	-2.6	0.9
Janesville (City)	8.1	10.8	9.4	-25.0	-13.8
Kenosha (County)	11.8	16.9	18.3	-30.2	-35.5
La Crosse (County)	10.9	11.1	10.8	-1.8	0.9
Madison (Dane County)	20.7	20.9	20.0	-1.0	3.5
Manitowoc (City)	15.1	15.5	14.9	-2.6	1.3
Milwaukee (Milwaukee-Ozaukee-Waukesha-Washington)	197.0	200.2	201.6	-1.6	-2.3
Racine (County)	29.2	29.1	29.2	0.3	0.0
Sheboygan (County)	17.9	18.2	18.3	-1.6	-2.2
Wausau (Marathon County)	11.5	11.6	11.6	-0.9	-0.9

PREPARING FOR THE GROWTH OF INDUSTRIAL ROBOTS PART II

by Robert Ayres and Steven Miller

The use of industrial robots is already replacing human labor. The extent of this automation trend is undetermined. Robert Ayres and Steven Miller of Carnegie-Mellon University point out, in this second-of-a-two-part article, the need to recognize the impact of robotics on the labor force. Industry, labor unions, educational institutions and government must cooperate to ease the economic and social disruptions latent in automation.

Acknowledging Potential Displacement

Almost all of the membership of the Robot Institute of America--and most potential robot users--fall within a group of industries commonly referred to as the metalworking sector. There are nearly three million workers employed in the nine occupations designated as the prime operative task for robots in the metalworking industries nationwide. Based on the average weighted response of the percent of jobs which robots could do, it appears that nearly half a million of these operatives could potentially be replaced by present day, Level I, robots. The figure roughly doubles to one million operatives if second-generation, Level II, robots with rudimentary sensing capabilities were available.

The estimates we have assembled for metalworking only cover a subset of all the manufacturing operatives who do the type of task which robots can do. Based on extending the data for metalworking to similar task in other sectors, Level I robots could potentially replace about one million operatives, and Level II robots could potentially replace three million out of a current total of 7 million operatives. The time frame for this displacement is at least twenty years, however.

By 2025, it is conceivable that more sophisticated robots will replace almost all operative jobs (about 7% of todays workforce). But by then, most current operatives would have retired or left their jobs anyway. So this transition seems hardly catastrophic on a national scale. It will probably be less dramatic than the impact of office automation over the same period. The jobs would not disappear all at once, and robots manufacturing and maintenance itself will provide some new jobs. Natural attrition can certainly take care of much of the remaining gap fairly painlessly. The important conclusion is that young people seeking jobs in the near future will have to learn marketable skills other then welding, machining, and other operative tasks that are being robotized. Nevertheless, the potential for social unrest in specific locations cannot be dismissed quite so lightly. Consider the following points:

* Over half of all the unskilled and semiskilled "operative" workers--the types of jobs which could be replaced by robots--are concentrated in the four metalworking industries 34-37). Almost one half of all production workers in these four industries are geographically concentrated in the five Great Lakes States--Indiana, Illinois, Michigan, Ohio and Wisconsin--plus New York and California. Within these same states, the metalworking sector also accounts for a large percentage of the total statewide employment in manufacturing. Adjustments in response to the rapid diffusion of robotics may be intensified in these areas. The impacts of not improving the productivity and competitive standing of these very same

industries will also be concentrated in the same few states.

* Older established workers would generally be protected by union seniority rules, except in cases where the whole plant closes (e.g. Youngstown). However, some younger workers with less seniority may be "bumped." Whenever this happens, the displaced worker starts again at the bottom of the ladder. Thus reemployed "displacees" are also more vulnerable to subsequent layoffs. A class of perpetually insecure, marginal workers could result. This would be a source of social problems and political dissension.

* The states where jobs are most likely to be lost to robots are mainly in the North Central Region where industry is also most unionized, and where the wages are the highest. The "Sunbelt" states, where many new jobs are being created, have significantly lower wages. Many displacees would have to migrate to other regions. Those unable to upgrade their skills sufficiently might have to accept lower paying jobs or join the "underclass" of insecure marginal workers who never became established with a stable employer.

* Among those with least seniority are disproportionate numbers of minorities and women--because these people have only achieved access to the better paying manufacturing jobs in recent years. De facto economic discrimination would accordingly increase.

* Unions representing the affected categorized workers would probably experience sharp declines in membership and political and economic clout. A policy of organized resistance to the introduction of labor-saving technologies might seem attractive to fearful workers, resulting in a severe drag on the productivity of the manufacturing sector.

The Role of the Major Actors

The major actors involved in the transition are private industry, labor, educational institutions, government.

These four actors must consolidate resources to anticipate and solve a related set of problems:

1. Building the human capital that can support the rapid development of new technologies--including robotics.

2. Preparing the current workers most likely to be affected for the changes to come.

Private Industry's Role

As industrial firms push forward with developing robotics, they should be more forthright in identifying the vulnerable categories of workers. Currently, industry is reluctant to identify the categories of jobs that will eventually be phased out. In the short term, there may even be shortages of workers in some of the "prime operative" candidates for robotization (i.e. machine operators and welders), which gives industry a disincentive to warn workers of the inevitable changes to come. Admittedly, planning of this kind may not be easy, since the rate at which robots

will be phased in depends on rapidly evolving technology, and on an uncertain economic climate. It is in industry's interest, however, to assume a more active role in planning future employment needs. It must ensure that the workforce gets an accurate preview of the requirements of tomorrow's workplace, and that the appropriate skills are sought and taught.

It is not enough for the business community to assert that educational and training institutions have not been responsive to real needs in preparing people for work life. Business has also contributed to the problem, for example, by viewing its participation with advisory councils of publicly funded training programs as perfunctory exercises in public relations without taking these responsibilities seriously.

Top management also creates the ground rules for how new technology should be evaluated. These ground rules determines which aspects of productivity improvement are emphasized. We think these decision criteria play a very important role in shaping the attitudes of middle management, operations staff, and even production workers, towards robots. As part of the recent Carnegie-Mellon University study, 19 robot users and 19 prospective robot users were asked to rank the factors influencing their decision to install robots. The survey results are shown in the Table below. Survey respondents overwhelmingly ranked efforts to reduce labor costs as their main motivation.

Motivations for Using Robots

RANK	USERS
1	Reduced Labor Cost
2	Elimination of Dangerous Jobs
3	Increased Output Rate
4	Improved Product Quality
5	Increased Product Flexibility
6	Reduced Materials Waste
7	Compliance with OSHA Regs
8	Reduced Labor Turnover
9	Reduced Capital Cost

RANK	PROSPECTIVE USERS
1	Reduced Labor Cost
2	Improved Product Quality
3	Elimination of Dangerous Jobs
4	Increased Output Rate
5	Increased Product Flexibility
6	Reduced Materials Waste
7	Compliance with OSHA Regs
8	Reduced Labor Turnover
9	Reduced Capital Cost

Source: CMU Robotics Survey: April, 1982

Many of the respondents who were interviewed suggested that the heavy emphasis on direct labor savings was imposed by the methods of financial analysis used to evaluate robot applications. Users frequently pointed out that the return on investment (ROI) calculation would not be favorable unless there is a dramatic decrease in direct labor cost. Arguments for the benefits of expanding capabilities, such as improving product quality or increasing production flexibility were often considered "nebulous" by the financial analyst. If the elimination of direct labor cost is the only benefit of robots acknowledged by management, there will undoubtedly be a perceived conflict between "successful" robot applications, and job security for workers.

While productivity can be improved by reducing the cost of producing a given mix of goods, it can also be raised by increasing the value of the goods which are sold. This can be done by producing more, by improving the quality of existing goods, or by creating and selling altogether new goods and services. Undoubtedly, pro-

duction cost reduction is important, but if all the emphasis is put on cost-reducing-process-innovation as opposed to value-increasing-product-innovation, management may inadvertently create the conditions for an adversial showdown with organized labor.

The Role of Educational Institutions

Three types of educational and training programs are needed to support the growth of robotics:

- Programs to train technicians to operate and program the new equipment.
- Programs to train workers to install and maintain automated machines.
- Programs to train people to engineer innovative production systems, supporting both:

  applied engineering and applications work for immediate needs, and

  basic research and long term development work.

We feel that colleges and universities in the United States do a good job at educating science and engineering students. The problem appears to be with training unskilled or semi-skilled people for operational functions in industry. It is not clear that many of our existing educational institutions have the capability, or even the inclination to involve themselves in training of this kind. Experience with publicly sponsored training programs suggest that, while they are reasonably capable of retraining workers who are already productive to do new jobs, they have seldomly been successful at training the "hard core" unemployed to be productive. The educational establishment must face up to this problem, since some of the factory jobs which have historically employed the least skilled workers--such as materhandlers and machine loader--will eventually be replaced by robots.

Much of the human resource development for robotics (in the narrow sense), particularly the training of operations and maintenance personnel, is now carried out by the robot manufacturers themselves. The major robot manufacturers are educating potential users about robot applications, and they are running special training schools. As the demand for robot information increases, the robot manufacturers may not have the capacity to fulfill the necessary requests for information and training. At present, there are few alternatives. Only a small number of schools and training institutes as yet have the equipment required to train people to use or repair robots, and it seems that the educational resources needed to do this kind of training are actually shrinking. Institutions are laying off people in the wake of general educational cutbacks despite a recognized need to train more people to use and service new technologies.

Education and training are also needed if displaced workers are to successfully transfer to alternative lines of employment. Although the factory workforce will need new skills, we anticipate that a smaller percentage of the labor force will be working in the factory as the decades pass. The frequency of occupational change may be as important a motivation for additional training and retraining as the upward trend in skill requirements. The least skilled workers, especially, will need better background training in order to enable them to enter the productive workforce in an environment were machines and robots do most of the "unskilled" tasks.

The educational establishment also

needs to face up to other deficiencies:

* There is too much emphasis on education for white collar jobs as opposed to training people to work with (i.e. supervise, maintain and repair) machines.

* Universities help to create a "status" hierarchy which puts theoreticians above practitioners, and professions and administrators above everybody else. Too much emphasis on "high prestige" occupations results in a surplus of professionals--such as lawyers and administrators--and a shortage of people who make things work.

* Even when blue collar workers want to improve their skills, facilities and teachers are scarce.

One of the major barriers to developing a skilled factory work is the difference in self esteem between the college educated and those in skilled trades. Blue collar and skilled workers do not have a favorable image in our society, despite the fact that many of these jobs require more schooling, and pay comparable wages. Trade school is often viewed as an alternative for students who flunk out of the academic track, or for students who are delinquent. Time magazine recently commented that, "Even the least academically inclined high school graduates now set their sights on college rather then on a technical education." They add that, "Young people going to work are choosing, or being steered into, white collar jobs outside the factory."

The Unions' Role

The Unions and management need ways of interacting cooperatively--rather than as adversaries--for dealing with issues of displacement and of changes in the workplace. Management wants to maintain a flexible posture for negotiating with the unions. This seems reasonable, from a management perspective, since the impending technological changes--hence, the precise labor requirements--are not yet well defined. Some managers feel that unions are seeking to formalize policies regarding displacement and workrules as early as possible, even before the situation is well defined, in order to establish precedents and protect their institutional structure. In response to this, management often adopts a "tight-lipped" policy on future automation plans. It would seem that if industry continues its non-communicative policy, the unions will continue to emphasize setting precedents in order to insure their survival in an uncertain environment. This type of "gaming" obstructs the type of planning that both unions and management need to do in cooperation with each other to solve real problems and achieve real benefits for workers and the public at large. Yet, neither side can reasonably be expected to change their positions unless there is outside intervention on the part of government to change the climate for negotiations.

In addition to cooperating with government and industry to help set the directions for retraining, organized labor might actively campaign to enhance the image of workers and of the industrial workplace. Factories have too long a history of being depicted as "hell holes." This depiction seems to have contributed to the low image of the factory worker.

Government's Role

The government can carry out four vital functions to promote a successful transition to robotics:

1. To act as an "honest" broker to bring industry, labor and educational institutions together, especially when these parties face each other in adversarial roles.

2. To provide financial incentives for investing in education and training.

3. To operate institutions to carry out education and training.

4. To gather data and disseminate information to assist in planning for future employment needs.

Arbitrating Adversarial Positions

It is not reasonable to expect firms to be more open with the unions if such disclosures would constrain the employers in what type of technology they could develop, or how they could use it. Neither is it reasonable to expect unions to be more cooperative with management, and more flexible in their bargainings positions, if such an attitude would threaten the security of workers and the long term viability of the unions themselves. The only way for both sides to break out of this bind is for government to change the conditions under which unions and industry talk to each other. In this context, the US may have much to learn from Japan, Germany and other industrial countries.

Providing Incentives for Education and Training

Most managers realize that they must eventually do something to provide part of their workforce with the skills required to supervise, maintain, and repair automated machines, and to assist the remaining part to acquire new skills appropriate for alternative employment. But there are substantial costs involved in education and training, and there is no incentive for firms to start addressing the problems today. This perception of lack of urgency must be overcome. One of the government's key roles should be to provide incentives which would induce industry to take positive action on upgrading its human resources now. For example, the government could give tax incentives to partially reimburse industry for education and training investments in their employes. It could provide more favorable tax treatment for individuals who undertake formal retraining programs in midcareer. And, of course, it could provide inducements (financial and other) to educational institutions to induce them to redirect their efforts into new areas.

Operating Education and Training Institutions

Education and training are established functions of all levels of government. It is vital that publicly funded education and training programs reflect the emerging--rather than the obsolete--needs of industry and society. Vocational education enrollments and completions in six metalworking occupational categories account for just over three percent of all vocational education enrollments for FY 1978. Several popular occupational categories for publically funded training programs are precisely those which have been identified as prime candidates for robots. It appears that public education institutions in the US have not yet recognized the future employment skill needs of society.

Training programs funded directly by government have an incentive to get people through a program quickly, and document their "success," even if they are providing people with obsolescent skills.

Passing money from the government to training institutes through industry would ensure that business plays a greater role in setting the directions for the skill requirements of the workforce. This type of indirect transfer provides a commercial incentive to educational institutions to develop curricula that better match the needs of business. It would also force business to take more of an interest in the quality of training and retraining programs.

On the other hand, there are potentially serious problems with giving business such a strong guiding hand in redirecting training needs, just as there are problems in insulating government and academic programs from the swiftly changing requirements of the "real world." Recently, management and business administration programs themselves have come under fire for excessive short sightedness in their planning. In the past, most firms have intitiated their own retraining "on demand," only after a need is clearly recognized. The federal government could do a better job of forecasting future societal needs and transmitting the information, in relevant form, to business and educational establishments.

Gathering Data and Disseminating Information

The future outlook for employment within most factory occupations cannot be extrapolated from historical data. The basic technological relationships governing the mix of labor and capital required to satisfy a given level of output are changing in very fundamental ways. Yet, government publications are still projecting employment requirements for many of the factory occupations without any explicit acknowledgement the impact of emerging production technologies--including robotics. In fact, the government publications used to counsel workers about the skill requirements and long term outlooks of various occupations make no mention of robots on the jobs where they are already in use. The 1981 edition of the Occupational Outlook Handbook makes no mention of robots in its description of production painters, welders, machine operators, inspectors, or assemblers. The handbook predicts that the need for welders will increase "because of the greater use of welding."

Welding was one of the earliest robot applications, and is one of the prime areas for future robot applications. Although the Handbook acknowledges that new technologies may slow the growth of the need for machine operators, it still advises potential machinests to prepare themselves with "thorough backgrounds in machining operations, mathematics, blueprint reading, and a good working knowledge of the the properties of metals." There is no mention of the need for machine operators to have an exposure to programmable machine tools or robots.

We see that long range planning of employment requirements and identification of vulnerable job categories cannot be carried out by government agencies, such as the Bureau of Labor Statistics, without inputs from industry. Neither industry nor society at large can afford the consequences of having people steered into occupations that may be phased out, or of not having people trained in skills such as programming, that are scarce.

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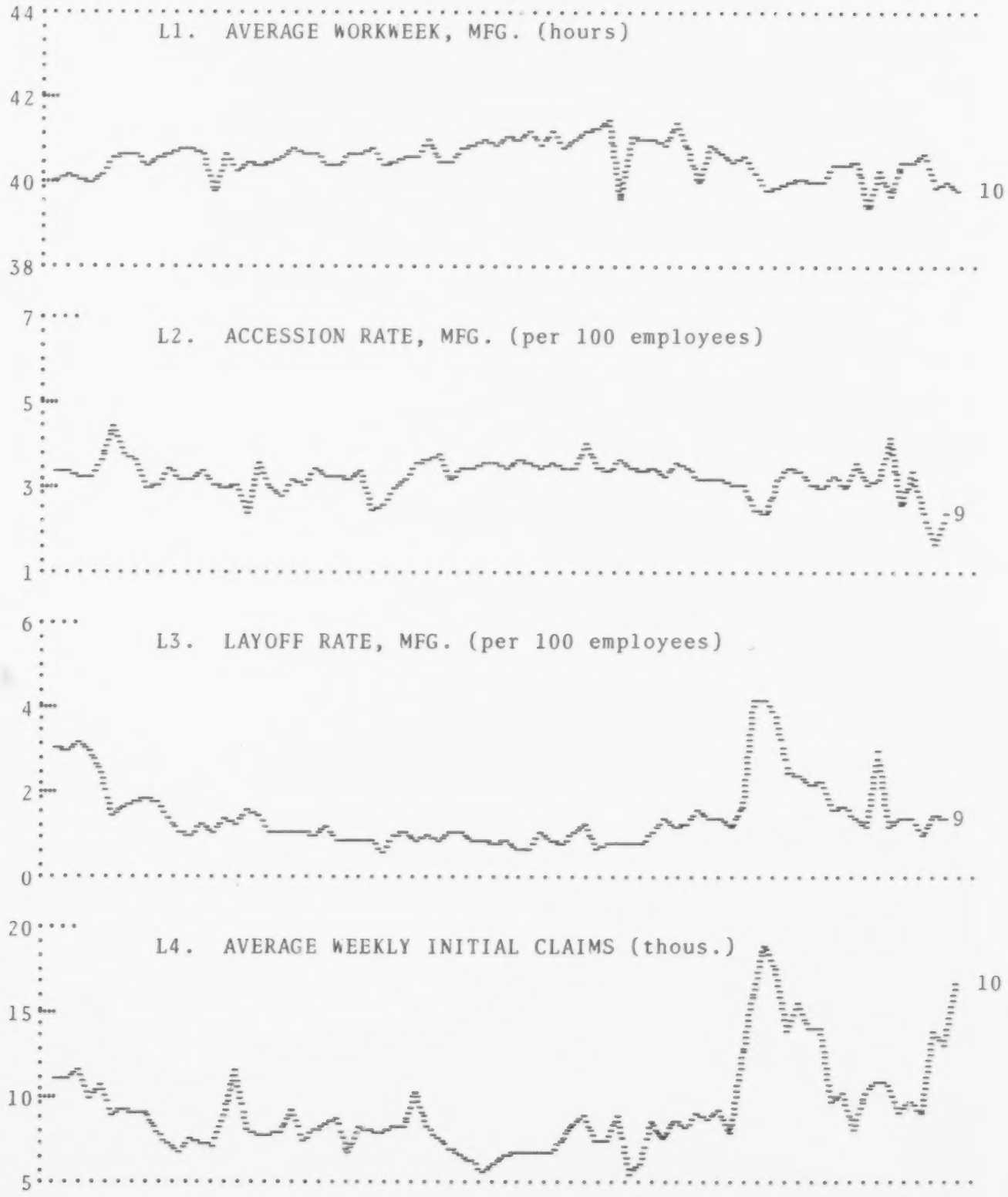

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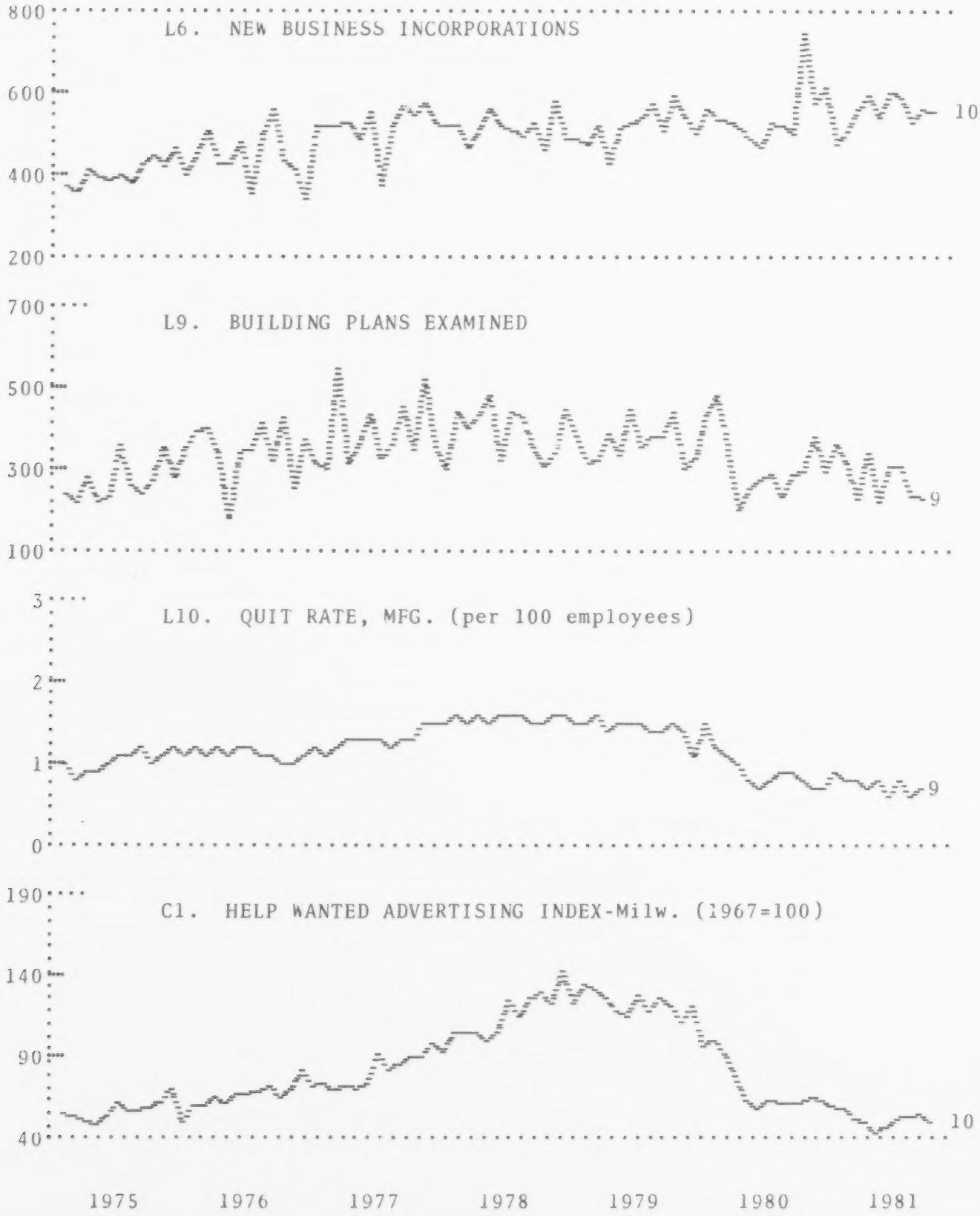

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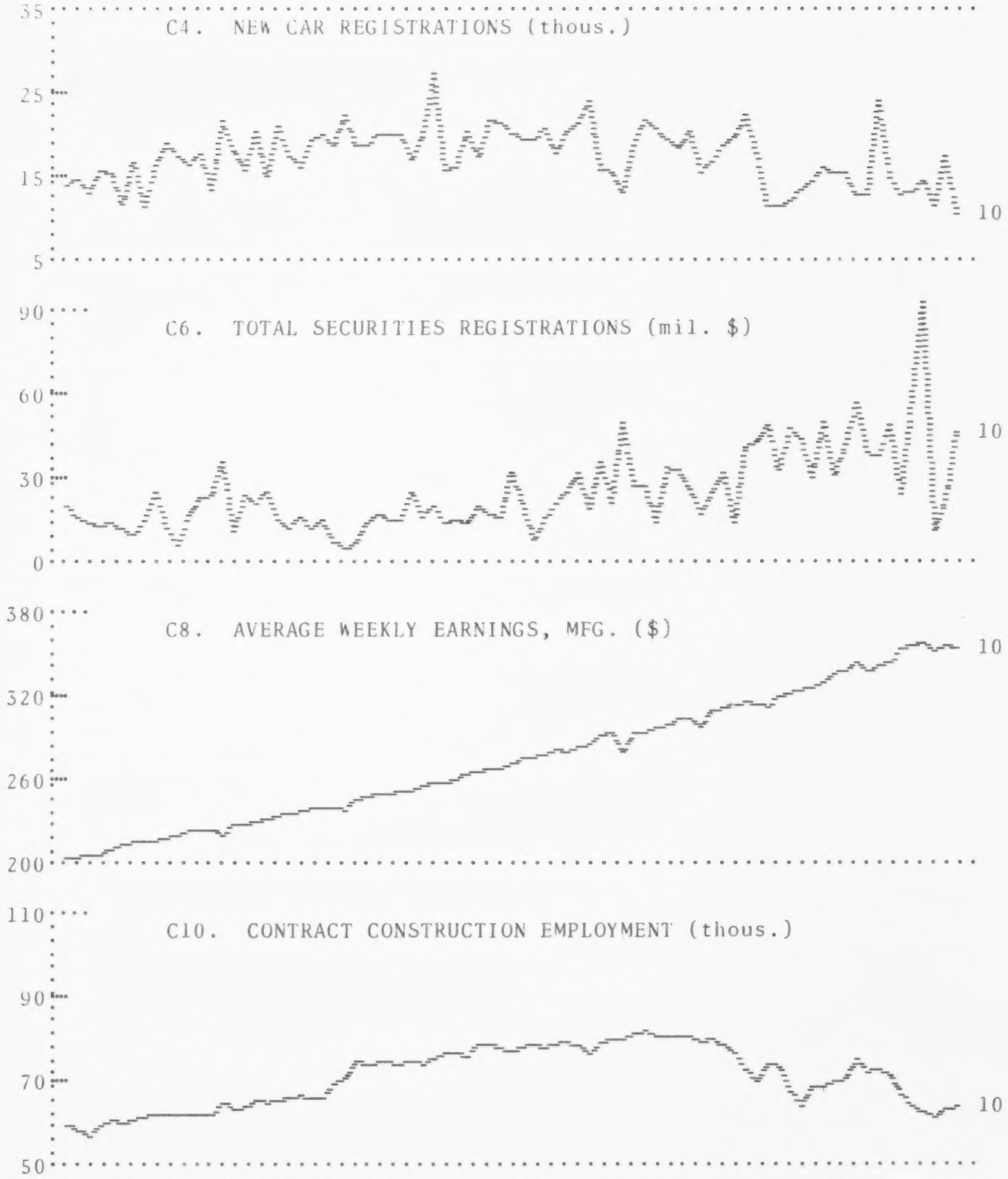

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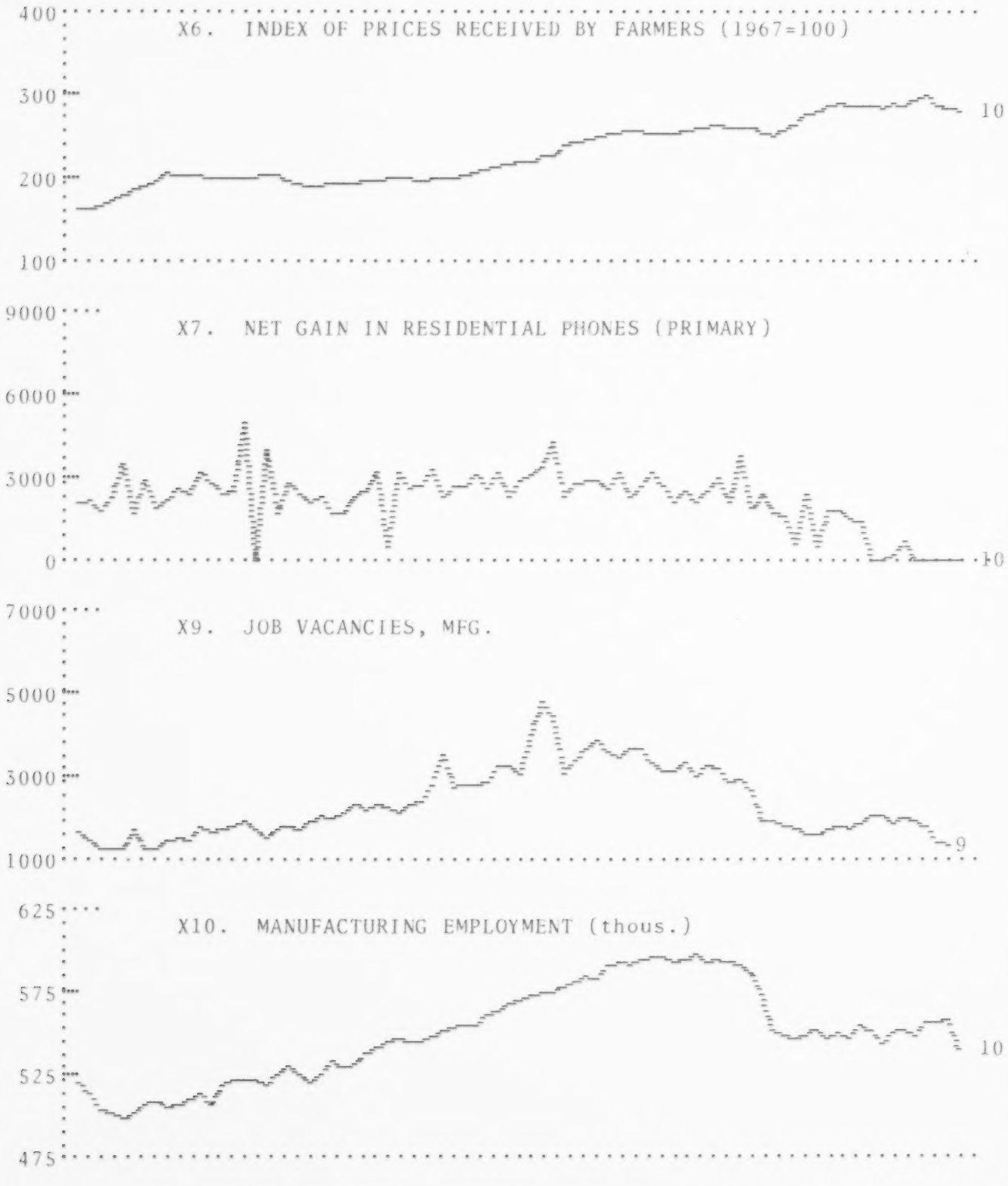

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